

Peritoneal Dialysis in Children with Renal Failure; Outcome and Complications

Wejdan Abid Sebt*, Sabih S Mehdi**

*Babylon Health Authority.**

*Babylon College of Medicine. ***

Abstract

Background: While the use of continuous renal replacement therapies in the management of children with acute and chronic renal failure have increased, the role of peritoneal dialysis (PD) in the treatment of pediatric renal failure (RF) has received less attention.

Objectives: This study considers causes of renal failure, complications during and after the procedure of peritoneal dialysis (PD), and their outcome.

Methods: A retrospective database review of children requiring PD for RF from March 2010 to July 2011 in pediatric peritoneal dialysis unit in Babylon Gynecology and Children Teaching Hospital. Fifty two patients with or without previously known underlying renal disease were investigated with biochemical and radiological studies and got no benefit from conservative management so they have been referred for PD for the treatment of their renal failure.

Results: The outcome of the patients with peritoneal dialysis was: Thirty three survivors (63.46%), mortality (19 cases) 100% during infantile period (1 day – 1 year) age group. Causes of mortality: Eighteen patients died due to multiorgan failure (94.73%) Causes of renal failure were: Sepsis (19), renal disease (15) cardiac problems (6), perinatal asphyxia (3), hemolytic uremic syndrome (3) hypovolemia (3) meningo-encephallitis (2) and inborn error of metabolism (1). Complications of PD occurred in (42.3%), the most prevalent was the need for further regular dialysis (45.8%).

Conclusion: The common age of death from renal failure is below one year, the commonest cause of death was multiorgan failure. Forty five percent of patients need another dialysis

الخلاصة

في الوقت الذي يتزايد استعمال الطرق المستمرة في الغسل الكلوي للأطفال ذوي العجز الكلوي يقل التركيز على دور البزل البريتوني الحاد المستعمل لعلاج هؤلاء المرضى.

الهدف:- دراسة أسباب العجز الكلوي والمضاعفات أثناء وبعد البزل البريتوني ونتائج البزل.

الطريقة:- هذه الدراسة تراجعية للأطفال الذين تم إجراء البزل البريتوني لهم من شهر آذار 2010 إلى حزيران 2011 في وحدة الغسل البريتوني في مستشفى بابل للنسائية والأطفال. عدد المرضى اثنان وخمسون مريضاً ممن كان أولم يكن لهم مرض كلوي سابق وتم إجراء الفحوصات المختبرية والشعاعية وثبت عدم جدوى العلاج التحفظي فأجريت عمليات البزل البريتوني لهم.

النتائج:- كانت نسبة الشفاء (63,46%)، عدد الوفيات (19)، (100%) خلال فترة الطفولة المبكرة (من عمر 1 يوم – 1 سنة) فئة عمرية. ومن الوفيات 18 حالة (94,73%) توفوا بسبب عجز الأعضاء المتعدد. إما أسباب العجز الكلوي فكانت (19) تسمم الدم الجرثومي، (15) أسباب بولية، (6) مشاكل القلب، (3) اختناق ولادي، (3) متلازمة تحلل الدم مع ارتفاع اليوريا، (3) انخفاض كمية السوائل في الجسم، (2) التهاب الدماغ والسحايا وحالة واحدة اختلال العمليات الأيضية الوراثي. إما المضاعفات فحدثت بنسبة (3، 42%) والغالبية كانت تحتاج إلى غسيل كلوي متكرر بنسبة (8، 45%)

الاستنتاج :- العمر السائد للوفيات مع العجز الكلوي هو دون السنة الأولى والسبب الشائع للوفاة هو فشل الأعضاء المتعدد، 45 % من المرضى يحتاجون إلى غسيل كلوي متكرر.

Introduction

Acute peritoneal dialysis (APD) Provides a non-vascular form of renal replacement therapy in children with acute renal failure (1) It is beneficial in the control of volume over load states in patients with cardiovascular compromise, haemodynamically unstable, or patients in whom vascular access is problematic. (2) It is also useful in treating hypothermia, malnourished and post-surgical cases. (3) Acute peritoneal dialysis (APD) is considered the optimal dialysis modality for renal failure in neonates. Peritoneal dialysis allow for the slow removal of fluid and solutes while avoiding haemodynamic instability and it is technically simple (4). It is easier to perform, cheaper and requires less sophisticated equipment than haemodialysis, it provides a better haemodynamic stability in children and avoids problems related to cannulation of the great vessels , systemic anticoagulation, and associated risks of ischemic and embolic complications as described during extracorporeal techniques (3,5) Peritoneal dialysis in developed countries remains an appropriate therapy for pediatric ARF for many causes (6) in addition PD is still a suitable modality of renal replacement therapy for children living in low socioeconomic condition despite the challenging problems in them . (7)

Aim of the study

To study the causes of pediatric kidney failure, complications with APD and outcome post APD.

Methods

A retrospective data base review at pediatric dialysis unit in Babylon Gynecology and Children Teaching Hospital for infants and children from the

age of 1day to 14 years for a period from March 2010 to July 2011. Data of 52 patients with acute and chronic renal failure including name, age, investigations before and after dialysis, complications related to APD, and outcome were recorded. Acute renal failure was defined as a rapid and progressive decline in renal function, manifested as a rising in plasma urea and creatinine concentration, which is usually accompanied by oliguria (< 1ml /kg/hr) urine output or occasionally polyuria. Eligibility criteria for dialysis included clinical features such as pulmonary edema, intractable hypertension not responsive to drugs, ureamic symptoms and heart failure. The laboratory indications included hyperkaleamia (serum potassium >6.5mmol/l), increased blood urea nitrogen 24mmol/l, serum creatinine 30 micro-mol/l in infants, and 500 micro-mol/l in older children (7,8) . Acute peritoneal dialysis was done manually in our center, the dialysis solutions were 1.49% glucose type (A), each Daniel fluid contained in a 2- liter plastic bag. Peritonitis was suspected if the patient has abdominal pain, cloudy dialysate, moisture around the PD catheter (9, 10). Statical analysis was done by using patient's demographic and clinical characteristics and analyzed descriptively. Outcome of patients was determined in number and percentage .Causes of renal failure, and causes of death and complications of peritoneal dialysis were studied.

Results

After one year and three months data collection period for fifty two patients with renal failure (acute and chron) referred to our unit for peritoneal dialysis, the outcome was: 33 survivors (63.46%) and 19 non survivors (36.54%) as shown in table (1).

Table (1) Out come after peritoneal dialysis

Outcome	NO.	%
Survivors	33	63.46
Non survivors	19	36.54
Total	52	100%

The patients enrolled in our study from 1 day - 14 years old were divided into three categories of age groups, the mortality was 100% in the infantile period (1day-1year) as shown in table (2).

Table (2) Mortality and age

Age	NO.	Patients
1day-1year	19	100%
2year-4year	zero	Zero
5year-14year	Zero	zero
Total	19	

The commonest cause of death in the infantile group was multiorgan failure (94.73) and only one neonate 4 days age died from intractable bleeding during APD, Table (3).

Table (3) Mortality related to multiorgan failure (MOF)

Cause of death	Number	%
With MOF	18	94.73%
Without MOF	1	5.26%
Total	19	100%

The causes of renal failure were: Sepsis 19 (36.5%), renal disease:15 (28.5%), cardiac causes 6 (11.5%), table (4).

Table (4) Underlying causes of renal failure

Causes of ARF	No.	%
1.Sepsis	19	36.5%
2.Renal causes	15	28.8%
3.Cardiac causes	6	11.5%
4.Perinatal asphyxia	3	5.7%
5Hemolytic Ureamic Syndrome	3	5.7%
6.Hypovolemia	3	5.7%
7.Meningoencephallitis	2	3.8%
8.Inborn error of metabolism	1	1.9%
Total	52	100%

Twenty two patients got complications after APD(42.3%) ,the most common problem was the need for further dialysis whether chronic peritoneal or regular heamo-dailysis (45.5%) .

Other problem (25%) with malfunctioning catheter which is a usual problem in

recurrent peritoneal dialysis due to adhesion or kinking of the peritoneal dialysis catheter. Two patients did not get a change in their urea level after APD,one with infection and the procedure failed in one patient. Table (5)

Table (5) Complications after peritoneal dialysis

complications	No.	%
Need another dialysis	11	45.8%
Malfunctioning catheter	6	25%
No change in blood urea	2	8.3%
Infection	2	8.3%
Failure of procedure(bleeding)	1	4.16%
Total	22	100%

Discussion

The study covered patients with renal failure (acute and chronic) who were on need for peritoneal dialysis from 1st of March 2010 till 30th of July 2011, the number of patients recruited was 52, thirty three patients have survived (63.46%) which is in agreement with a study done by J T Flynn et al in USA (6). Nineteen patients died, all of them were in the infantile period (100%) and it is in agreement with a study done by Debra M W et al (2). The number of patients who died during peritoneal dialysis was most commonly due to MOF (94.73%) this high percentage is in a relative agreement with another study (88%) done by Debra M W et al (2). Causes of renal failure due to sepsis represents 36.5% which is higher than a study done by J T Flynn et al in USA (6) when sepsis form 15.8% and this may be explained by delayed diagnosis. Renal problems as a cause of end stage renal failure form (28.8%) which is much less than 86.9% found in a study done in a developed country by Hanne L et al (11), it may be due to level of the center (3rd referral) type in developed countries Hemolytic Uremic Syndrome forms 5.7% which is lower than what was detected in a study done by G filler (20%) (12), it may be due to lower number of HUS cases in our society or they are missed. Perinatal asphyxia was found in (5.7%) which is nearly equal to what was found in a study done by Hanne L et al (11). Hypovolemia 5.7% as a cause of renal failure was found lower than 18.36% as

in a study done by Ploumis S P et al (13) because we deal with medical causes of renal failure more than post surgical cases looked after in that study. We found meningoencephalitis as a central cause for renal failure 5.7% nearly equal to 3.5% found in another study done in UK by Irit K et al (14). The commonest complication was found in the study was a need for another dialysis (45.8%) because CRF patients need continuous PD or intermittent hemodialysis as a common sequence for them, this result found the same in another study done by Debra M W et al (2). Malfunctioning catheter was encountered in 25% which is a lower figure compared to a study done by J T Flynn et al (6). Infection at the site of the catheter developed in 8.3% which is higher than 3.7% detected by Dr. I C Anochie (1). Failure of the procedure due to bleeding (4.16%) which is nearly the same as compared to 2.7% found in a study done by R E day (15).

Conclusion

The common age of death from renal failure is below one year, the commonest cause of death was multiorgan failure. Forty five percent of patients need another dialysis.

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