

Complications of continuous ambulatory peritoneal dialysis: An early experience in tertiary hospital of Western region of Nepal

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INTRODUCTION

Infections of exit site, subcutaneous catheter tunnel infection and peritonitis are most common complications of CAPD followed by non infectious catheter related problem like hernias, gradual loss in effectiveness of procedure which often leads to force cessation of the CAPD procedure.¹

CAPD has emerged as a feasible modality of renal replacement therapy.² CAPD was started in Nepal in 1998. Because of its high peritonitis rate the programme was not successful.³ PD associated peritonitis has significant morbidity and treatment failure.^{4,5} Catheter-related problems are the major causes of technique failure and account for approximately 20% of change to hemodialysis (HD).^{6,7}

ABSTRACT

Background and Aims: Chronic ambulatory peritoneal dialysis (CAPD) has been established form of therapy in adults patients with end stage kidney diseases and has emerged as a feasible modality of renal replacement therapy. The aim of the study was to evaluate the complications of CAPD and its contributing factor in order to improve the patient survival and reduce morbidity and mortality.

Methods: A hospital based retrospective study of 35 patients who opted for CAPD at Manipal teaching hospital, Pokhara from 1st June 2015 to 31st May 2016 was carried out.

Results: Total 35 CAPD patients were included in study. The mean age of the patients was 45.78±16.34 years. Nineteen (54%) patients were male. The total follow up was 533 patients months with mean follow up of 15.22 ±5.02 months. There were 41 episodes of different complications that occurred during the study period with rate of 0.9 episodes/patient years. There were 18 (43%) episodes of peritonitis including 5 recurrence of peritonitis in 5 patients, 6 (15%) exit site infections, 6 (15%) failure of drainage, 2 (5%) pericatheter leakage, 2 (5%) catheter displacement, 2 (5%) omental wrapping, 2 (5%) catheter removal, 2 (5%) mortality. The commonest pathogen for peritonitis was staphylococcus aureus in 5 (22%) episodes.

Conclusion: Overall complications rate was comparable to other studies. Peritonitis rate has been declined in our study. The majority of non-infectious complications are treatable and do not interfere with the catheter survival. CAPD is a safe and viable mode of renal replacement therapy alternative to hemodialysis.

CAPD has gained popularity due to better hemodynamic stability, better quality of life, allows more independent and mobility, absence of need to vascular access, introduction of CAPD Y system, 'flush before fill' technique have decreased the rate of peritonitis hence making CAPD a feasible alternative to hemodialysis.^{8,9}

In Nepal due to the geographical terrain, hemodialysis centers are mostly limited to major cities. Hence CAPD is opted by many End stage renal disease (ESRD) patients belonging to rural regions of Western Nepal. Manipal teaching hospital is

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providing CAPD service to ESRD patients since a year and a half for the first time in this region. There is a lack of information about the complications of CAPD in this subpopulation. This prompted to conduct a retrospective study to determine the complications of CAPD.

METHODS

This retrospective observational study was carried out in 35 patients of ESRD undergoing CAPD in Department of medicine, nephrology unit, Manipal teaching hospital from 1st June 2015 to 31st May 2016 to evaluate the complications of CAPD and its contributing factor in order to improve the patient survival and reduce mortality. Both infectious and non-infectious complications in these patients occurring during the course of therapy were included. Double-cuffed straight Tenckhoff catheter was inserted in by a nephrologist, using a seldinger technique in the midline. All patients received as prophylaxis 1gm cefazolin intravenously prior to surgery. Before catheter insertion location of exit site was carefully chosen so that it would be cleaned and chance of inadvertent trauma (by belt) could be minimized. The skin exit was made at the counterpoint of the catheter insertion site in a downward direction After catheter placement, all incision sites were covered and left the dressing undisturbed for 3 days to allow epithelization and wound healing by primary intention.. After break-in period, the patients were initiated on manual exchanges using twin-bag system. All patients were taught to apply 2% mupirocin cream to the exit site with a cotton bud, following exit-site care or alternate days. Patients were advised to immediately contact telephonically for any assistance and advice. Peritonitis was diagnosed when at least 2 of the following were present: (1) clinical features consistent with peritonitis, i.e. abdominal pain and/or cloudy dialysis effluent; (2) dialysis effluent white cell count > 100/ μ L or > 0.1 x 10⁹/L (after a dwell time of at least 2 hours), with > 50% polymorphonuclear; and (3) positive dialysis effluent culture. All patients with peritonitis were treated as per the International Society for Peritoneal Dialysis protocol. Patients presented with catheter malfunction underwent radiograph of abdomen to diagnose catheter migration. Exit site infection is defined as presence of purulent discharge with or without erythema of the skin at the catheter epidermal interface. Omental wrapping was diagnosed when patient presented with poor inflow and outflow of peritoneal fluid. Laparoscopic exploration was done to establish diagnosis of Omental wrapping. All patients who survived and/or had more than 6 months follow up on this treatment with last follow up till 31st May 2016 were included. The comorbid illnesses, survival and complications related or unrelated to peritoneal dialysis were reviewed. Set of questionnaire proforma was completed and analyzed by SPSS 22.0 software.

RESULTS

Total 35 CAPD patients were included in study. Clinical characteristics of patients are shown in Table 1. The mean age of the patients was 45.78 \pm 16.34 years. Nineteen (54%) patients were male. The cause of ESRD were as follows: chronic glomerulonephritis 12 (35%), diabetic nephropathy (31%), hypertensive nephropathy 11 (25 %), chronic interstitial nephritis 2 (6%), polycystic kidney disease 1 (3%). Nineteen (54%) patients perform their peritoneal dialysis exchange on their own. The total follow up was 533 patients months with mean follow up of 15.22 \pm 5.02 months.

There were 41 episodes of different complications that occurred during the study period with rate of 0.9 episodes/patient years. There were 18 episodes of peritonitis including 5 recurrence of peritonitis in 5 patients, 6 failure of drainage, 2 (5%) pericatheter leakage, 2 (5%) catheter displacement, 2 (5%) omental wrapping, 2 (5%) catheter removal, 2 (5%) mortality Table 2. Among 2 catheter removal one had fungal peritonitis and other due to mechanical dysfunction and eventually both of them switched to hemodialysis. Catheter reinsertion was done in one patient after 8 weeks. Among 2 mortality, one died due to intracranial hemorrhage and other due to sepsis.

The peritonitis was due staphylococcus aureus in 5 (22%) episodes, Escherechia coli in 4 (22%), Coagulase negative Staphylococcus aureus in 2 (11%), Pseudomonas spp 2 (11%), Acinitobacter baumanii 1 (5%), fungal 1 (5%), no growth in culture 3 (16%) Table3.

Infectious complications were compared with different variable, however didn't show statistically significant values with age sex, serum albumin, cause of ESRD and duration of CAPD Table 4. Likewise association of different age group and gender with CAPD complication were obtained but did not show any statistically significant values Table 5.

Table 1: Baseline characteristics of patients on CAPD

Characteristics		
Age (years)	Mean (SD)	45.73 \pm 16.34
Gender (male)		19
Etiology of CKD	Chronic glomerulonephrtis	12
	Diabetic nephropathy	11
	Hypertensive nephropathy	9
	Chronic interstitial nephritis	2
	Polycystic kidney disease	1
Exchange performed by patient		19
Duration of CAPD (months)	Mean (SD)	533 15.22 \pm 5.02

Table 2: Frequency of complications

Complications	No. of episodes	Percentage
Peritonitis	18	43
Exit site infection	6	15
Poor outflow	6	15
Pericatheter leakage	2	5
Catheter migration	2	5
Omental wrapping	2	5
Catheter removal	2	5
Catheter reinsertion	1	2
Death	2	5
	41	100

Table 3: Organism responsible for infections

	Pathogens	No of episodes	% of total episodes
PD Peritonitis	Staphylococcus aureus	5	22
	Escherichia coli	4	22
	Coagulase negative Staphylococcus aureus	2	11
	Pseudomonas spp	2	11
	Acinetobacter baumannii	1	6
	Fungal	1	6
	No organism in culture	3	17
Exit site infection	Pseudomonas spp	2	33
	No organism in culture	4	67

Table 4: Qualitative variable comparison with infectious complications

Variables		Infectious Complications		P Value
		Present	Absent	
Age	Mean (SD)	50.25 (19.32)	43 (14.82)	0.225
Sex	Male	5	14	0.279
	Female	7	9	
Diabetic Nephropathy	Present	4	7	0.861
	Absent	8	16	
Hypertensive Nephropathy	Present	5	4	0.119
	Absent	7	19	
S. Albumin	Mean (SD)	3.22 (0.42)	3.25 (0.62)	0.855
Duration of CAPD (months)		15.33 (5.74)	15.17 (4.86)	0.932

Table 5: Association of age group and gender with CAPD

complications

Compli-cations	Age group		P value	Gender		P value
	< 40 years	≥40 years		Male	Female	
Peritonitis	5	6	0.983	4	7	0.151
Exit site infection	1	5	0.187	3	3	1.0
Poor outflow	1	4	0.347	3	3	1.0
Pericatheter leakage		2	0.489	1	1	1.0
Catheter migration	1	1	1.0	2		0.489
Omental wrapping	1	1	1.0	2		0.489

P value obtained from Chi square/ Fisher’s Exact test as appropriate

DISCUSSION

Clinical characteristics of our patients were comparable to other studies.¹⁰ However less than one third of patient in our study were diabetic nephropathy where as other study have reported high proportion of diabetic nephropathy.^{3,11,12}

This study shows that the rate of overall complications of CAPD was comparable to other studies.¹³ PD peritonitis remains the Achilles heel of CAPD programme leading to technique failure, mortality and morbidity. Since the introduction of Y set, flush before fill, there is decline in the rate of peritonitis globally. In our study, the frequency of PD peritonitis was the highest among all complications. Our study shows that the rate of PD peritonitis was 0.40 episodes/ patient year. This rate is declining trend in peritonitis when compared with other studies done in Nepal and abroad.^{3,10,13}

Gram positive peritonitis is the leading cause of PD peritonitis globally.⁴ In our study, the commonest pathogen causing peritonitis was Staphylococcus aureus. Similar findings were observed in other studies.^{3,14}

Fungi are uncommonly implicated, being responsible for only 2-16% of all peritonitis episodes associated with CAPD.¹⁵ Fungal peritonitis, if not detected early and treated appropriately, is associated with increased morbidity and mortality.¹⁶ In our study, one patient had fungal peritonitis and treated with prompt removal of CAPD catheter and antifungal. Occurrence of peritonitis in our patients was due to inability to adopt good aseptic practices, contamination at the time of PD exchange which explains the need to improve the training of aseptic

technique especially hand washing and connectology.

Mechanical complications like pericatheter leakage and catheter migration were managed conservatively with PD rest for 2 weeks and laxatives respectively. However omental wrapping was treated by repositioning and omentopexy under laparoscopic procedure. This new laparoscopic technique using an extraperitoneal approach with omentopexy for PD catheter placement could prove extremely useful for preventing catheter malfunction caused by catheter tip migration, pericatheter leakage, omental wrapping, and periodic catheter movement that causes abdominal pain in CAPD.¹⁷ The majority of non-infectious complications in these patients were treatable and did not interfere with the catheter survival.

The limitation of this study, as with many studies, is the small number of cases.

Conclusion: PD peritonitis is the commonest complications among overall complications. The majority of non-infectious complications were treatable and did not interfere with the catheter survival. Ideal selection of patients who can adhere to the basic principles of asepsis can give good outcome in CAPD programme. It can emerge as a safe, viable mode of renal replacement therapy for ESRD patients dwelling in remote and geographically difficult regions in developing countries such as Nepal.

Conflict of Interest: None declared.

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