

# Clinical Profile and Complications of Continuous Ambulatory Peritoneal Dialysis in Kashmir

Mohd Iqbal Dar<sup>1</sup>, Iqra Jan<sup>2</sup>, Mohd Ashraf Bhat<sup>3</sup>

## ABSTRACT

**Introduction:** CAPD is one of the renal replacement therapies which is gaining popularity in the developing world especially India. This study was aimed to study the clinical profile and complication of Complications of Continuous Ambulatory Peritoneal Dialysis (CAPD).

**Material and Methods:** Patients on CAPD at our center were evaluated for their clinical profile, complication and outcome on follow-up.

**Results:** A total of 100 patients were included in the study. There were 66% males and 34% females. Mean age of the patients was 47.95±6 years. Hypertension was seen as etiology in 36%, Diabetes in 27%, chronic glomerulonephritis in 22%, Analgesic nephropathy in 4%, Obstructive nephropathy in 3% and in 4% cases no obvious cause for CKD could be found. Among the complications pain was seen in 11%, pericatheter leak in 5%, bleeding 7%, intestinal perforation in 2%, hernia in 5%, total obstruction in 4%, exit site infection in 7%, tunnel infection in 2% and total 111 episodes of peritonitis. Technique survival at 1 year and 2 years was 97% and 94% respectively. Patient survival at one and two years was 90% and 78% respectively

**Conclusion:** CAPD presents a viable form of renal replacement therapy. There has been sustained decrease in complication rates and improvement in technique and patient survival with advancement in catheter implantation and complication management

**Keywords:** Continuous Ambulatory Peritoneal Dialysis, CAPD Complications, CAPD Outcome, CKD, Peritonitis in CAPD

## INTRODUCTION

Continuous ambulatory peritoneal dialysis is an intracorporeal dialysis where Heart acts as blood pump and Peritoneum as dialyzer. The total surface area of peritoneum is approximately equal to the surface area of adult skin with blood supply of 60-70 ml/min. The necessary elements for an effective peritoneal dialysis are a healthy peritoneal cavity lined by a functional membrane, an indwelling catheter placed in the peritoneal cavity and dialysis fluid with a delivery system.<sup>1</sup> Continuous Ambulatory Peritoneal Dialysis (CAPD) entails a close system whereby fluid is initially instilled by gravity into peritoneal cavity and drained out after dwell time of several hours.<sup>2</sup> The system uses commercially prepared sterile dialysate fluid in a bag connected by silastic tubing to a Tenckhoff catheter which leads the fluid into the peritoneal cavity. Since the first use of peritoneal cavity for dialysis in guinea pigs in 1923, there has been significant improvement in technique and outcome

of peritoneal dialysis.<sup>3</sup>

There is dramatic rise of CAPD over the last 2 decades worldwide. CAPD comprises as a modality of treatment in more than 15% of the total dialysis population. It is the most popular form of dialysis in Canada, UK, Hong Kong and Mexico. This dramatic rise in CAPD as modality of treatment is due to success in decreasing the incidence of peritonitis and other complications due to CAPD.<sup>4</sup> This study was aimed to study clinical profile and complications of patients on CAPD in our state.

## MATERIAL AND METHODS

This study was conducted over a period of two years at Sher-i-Kashmir institute of medical science Soura Srinagar (Kashmir) India. Sher-i-Kashmir institute of medical sciences is the only tertiary center providing the services of CAPD as a means of renal replacement therapy in the Kashmir valley. In our study all the patients on CAPD were included. Patients already on CAPD and following nephrology department, their records were analyzed and included in the study and then followed till the completion of the study. All the new patients in whom CAPD was put in were also followed till completion of the study.

### Inclusion Criteria

All the patients put on CAPD were included in the study.

### Exclusion Criteria

Patient on CAPD who denied Consent were excluded.

### Methodology

- All the patient's (put on CAPD) particulars were noted.
- Etiology of the ESRD was looked for.
- Date of CAPD catheter placement was recorded.
- Any concomitant illness was looked for.
- General physical and Systemic examination of the patient was done.
- Immediate complications of CAPD like pain, hemorrhage, bowel injury, Pericatheter leak were noted.
- Long term complications like inflow failure, outflow

<sup>1</sup>Senior Resident, Department of Cardiology, SKIMS, <sup>2</sup>PhD, Immunology and Molecular Medicine, SKIMS, <sup>3</sup>Professor and Head of Department, Department of Nephrology, SKIMS, India

**Corresponding author:** Mohd Iqbal Dar, Senior Resident, Department of Cardiology, SKIMS, SOURA, J&K, India

**How to cite this article:** Mohd Iqbal Dar, Iqra Jan, Mohd Ashraf Bhat. Clinical profile and complications of continuous ambulatory peritoneal dialysis in Kashmir. International Journal of Contemporary Medical Research 2020;7(4):D1-D5.

**DOI:** <http://dx.doi.org/10.21276/ijcmr.2020.7.4.16>



failure, total obstruction, hernia formation, hydrothorax and genital edema were looked for.

- Infective complications of CAPD were noted.
- Outcome of CAPD in terms of morbidity, technique failure and mortality were noted.

**RESULTS**

In our study a total of 100 patients were included over a period of two and a half years. The following observations were made. The mean age of patients on CAPD in our study was 47.95±4years. There were 66% males and 34% females in this study. 76% of cases were living in the rural areas and 24% were living in urban areas. The etiology of CKD is given in Table 01. Hypertension (HTN) was identified as the most common cause, Analgesic nephropathy (AgNep) was seen in 4% cases. Obstructive nephropathy (ObsNep) was observed in 3% cases and was the least common causes observed.

The mean duration of patients on CAPD was 19.76±4

months. The complications observed in the study population are shown in table 02. Peritonitis was the most common complication observed. Overall one or more episode of peritonitis was seen in 56% of the study population on follow up. Total duration of follow in this study was 1976 months (164.44years). Total number of episodes of peritonitis in this study was 111. Mean episode per patient was 1.12 episodes/patient. The number of episodes of peritonitis per patient per year was 0.675 episodes/patient/year.

The outcome of the study in terms of technique and patient survival is shown in table 03. In this study 64% of cases were alive and the end of study. 25% patients had died. Most deaths were due to CAPD induced peritonitis leading sepsis, pneumonia and cardiovascular events and heart failure. Most deaths occurred in patients having diabetes as underlying cause of renal failure. In 4% of patients catheter was removed in total due to recurrent bacterial peritonitis and fungal colonization of the catheter. In 6% of cases catheter was removed because patient underwent renal transplant.

| Etiology | HTN     | T2DM    | CGN     | PKD   | AgNep | ObsNep | UK    | Total     |
|----------|---------|---------|---------|-------|-------|--------|-------|-----------|
| N (%)    | 36(36%) | 27(27%) | 22(22%) | 4(4%) | 4(4%) | 3(3%)  | 4(4%) | 100(100%) |

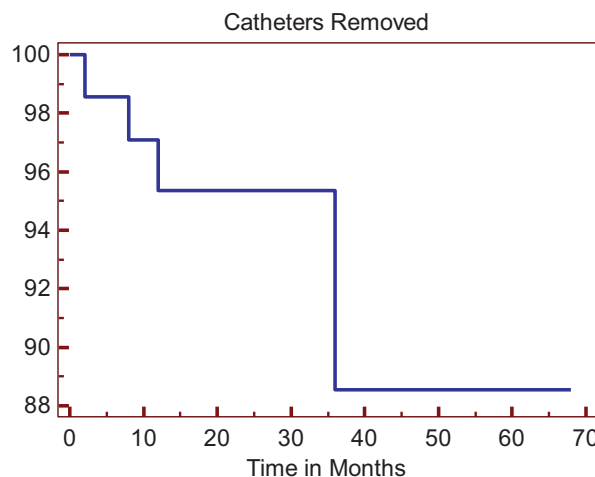
**Table-1:** Etiology of CKD

| Complication        | N (%)   |
|---------------------|---------|
| Pain                | 11(11%) |
| Pericatheter leak   | 5(5%)   |
| Bleeding            | 7(7%)   |
| Perforation         | 2(2%)   |
| Genital edema       | 10(10%) |
| Hydrothorax         | 4(4%)   |
| Hernia              | 5(5%)   |
| Heamoperitonium     | 0(0%)   |
| Inflow obstruction  | 9(9%)   |
| Outflow obstruction | 1(1%)   |
| Total obstruction   | 4(4%)   |
| Exit site infection |         |
| 1 episode           | 6(6%)   |
| 2 episodes          | 1(1%)   |
| Tunnel infection    | 2(2%)   |
| Peritonitis         |         |
| 1 episode           | 22(22%) |
| 2 episodes          | 14(14%) |
| 3 episodes          | 11(11%) |
| 4 episodes          | 7(07%)  |
| Total episodes      | 111     |

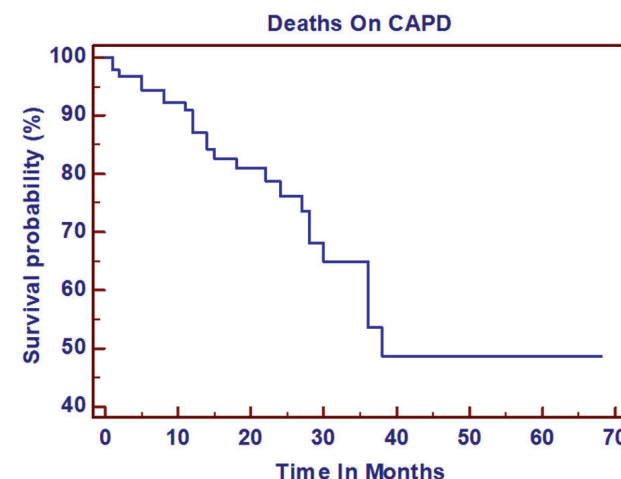
**Table-2:** Complications of CAPD in the study

| Outcome   | N (%)     |
|---|-----------|
| Alive   | 64(64%)   |
| Died  | 25(25%)   |
| Catheter removed due to infection                     | 4(4%)     |
| Catheter removed due to renal transplant              | 6(6%)     |
| Catheter removed due to infection and then reinserted | 1 (1%)    |
| Total   | 100(100%) |

**Table-3:** Outcome of the study



**Figure-1:** Kaplan Meier scale showing Technique survival in our study.



**Figure-2:** Kaplan Meier scale showing Patient survival in our study.

In 1% of cases catheter was removed and then successfully reinserted after properly treating the infection.

Technique survival in our study was 97% at one year and 94% at 2 years as calculated by Kaplan Meier scale (figure 1).

Patient survival in this study was 90% at one year and 78% at two years as shown in Kaplan Meier scale in figure 2 below.

## DISCUSSION

At our center during the period of study a total of 100 patients on continuous ambulatory peritoneal dialysis were recruited in the study. The study population varied in age widely. The youngest patient was 15 years of age and the oldest patient was 75 years old, majority of patients were of middle age group of 30- 50 years and comprised 51% of the study population. Two third of the patients were males and majority of patients were having a rural background. This reflects the fact that 80% of population resides in the rural areas. The mean duration of patients on CAPD in our study was 19.76±4 months.

Hypertension was identified as the most common cause with 36% of cases having this as etiology for CKD, diabetes was the second most common cause with 27% patient having it as an etiological factor and chronic glomerulonephritis was the third most common cause. These results were consistent with other studies which identified this triad as the major contributor for CKD development.

Pain was noted in 11% of patients after insertion of the CAPD catheter. Patients usually complained of pain in the shoulder which is interpreted as referred pain from diaphragm. This pain disappeared after a few days. Some patients also complained of pain during rapid inflow of dialysate. This pain decreased by decreasing the inflow rate of the dialysate. Pain in our study is significantly lower than that observed by E.W. Boeschoten, who reported incidence of about 25%.<sup>5</sup> This may be due to improvements in the catheter insertion techniques and better understanding of dialysis technique by the patients in our study.

Immediate bleeding was seen in 7% of cases after insertion of catheter. This was due to trauma to minor blood vessels and abdominal wall tissue. Bleeding was minor and it settled after a few exchanges of dialysis. Incidence in our study is comparable to incidence seen by Smith SA, Morgan SH and Eastwood JB, who recorded incidence of 6.45% (2 cases out of 31) in their study.<sup>6</sup>

Perforation of viscus is the most dangerous of all the early complications of catheter insertion. In our study there were 2 incidence of intestinal perforation amounting to total of 2% cases, same as the incidence of 1-2% noted by Simkin EP, Wright FK in their study<sup>7</sup> and incidence of 1-3% reported by Zappacosta AR<sup>8</sup>, Moreiras plza M<sup>9</sup> and Nielsen PK.<sup>10</sup>

The most common non-infectious complication we noted in our study was Genital edema. It was seen in 10% of case in our study and presented as scrotal edema mostly in men and a few cases of labial edema in women. Similar results of 8-10% of genital edema were noted by Tzamaloukas AH, Gibel LJ, Eisenberg B, et al in their study.<sup>11</sup>

Hydrothorax on the right side developed in 4% of cases during the follow up period of our study this was in accordance to the result of 1 to 5% of hydrothorax seen by Chow KM, Szeto CC and Li PK<sup>12</sup> and 1.6 to 10% by Fletcher S, Turney JH, Brownjohn AM.<sup>13</sup> Hydrothorax is most common on right side because of presence of more multiple small pores on right side of diaphragm and lesser number on the left side due to presence of overlying pericardium and heart on the left side.

Hernia in the inguinal region was seen in 5% of cases of our cases. All the patients were males. It is thought to be due to patency of processus vaginalis in men due to decent of testis in the scrotum during early life. Spence PA, Mathews RE, Khanna R, et also found the same incidence of 5% of hernia in their study.<sup>14</sup> Afthentopoulos IE, Panduranga Rao S et al also found the incidence of 11% in their study.<sup>15</sup> This lower incidence of hernia in our study as compared to that of Afthentopoulos IE et al is due to presence of more number of young patients and who were not having obesity as an additional risk factor.

There was not any case of Hemoperitoneum in our study as compared to incidence of 8.4% reported by Tse K, Yip P et al who reviewed the cases of 549 patients.<sup>16</sup> This difference may be due to comparably smaller sample size and lesser number of premenopausal female patients in our study as menstruation is the most common cause of recurrent Hemoperitoneum in CAPD patients.

Another complication presenting shortly after catheter insertion was Pericatheter leak, it was observed in 5% of cases. This incidence is slightly better than that of 8.9% observed by Teresa Garcia Falc6n, Ana Rodriguez-Carmona<sup>17</sup> and 7 to 24% observed by Frances DMA, schofeild I, et al.<sup>18</sup>

There were three types of catheter related malfunctions seen in our study. Most common of them were inflow obstruction. There was one episode of inflow obstruction in 9% of the cases. One episode of outflow obstruction was seen in 1% and two episodes in 1% of cases. One episode of Total obstruction was seen in 4% of cases. In total 15% of patients developed some kind of catheter flow related malfunction during the course of the study. Teresa Garcia Falc6n, Ana Rodriguez-Carmona, Miguel perez FontAn et also had about the same incidence of catheter mal function of 13% in their study.<sup>17</sup> Catheter malfunction in our study was due to catheter kinking, omental trapping, fibrin and blood clot in the catheter causing obstruction and usually responded to conservative methods of heparin or urokinase injection into catheter and treatment of constipation.

Exit site infection in our study was seen in total of seven percent of cases. There was one episode of exit site infection in 6% of cases and two episodes in 1% of cases. There were total of 8 cases of exit site infection which amounts to total of 0.048 episodes/patient year. About same incidence of 0.05 to 1.02 episodes/patient year has been noted in various other studies like Georgi Abraham, Egeige savin et al<sup>19</sup>, Piraino B, Bernardini J, Johnston JR<sup>20</sup> and Oreopoulos DG, Baird-Helfrich G, Khanna R.<sup>21</sup> Exit site infection was characterized by mild erythema and swelling at the exit site of the catheter

which responded to the antibiotic treatment. In addition tunnel infection seen in 2% of cases who presented with pain erythema, and discharge at the catheter site associated with fever. Both the patients were treated successfully after taking cultures and appropriate antibiotics.

Of all the complications of CAPD the most common complication was peritonitis. 46% of cases didn't had any episode of peritonitis. There was one episode of peritonitis in 22% patients, two episodes in 14%, three episodes 11% and four episodes in 7% of cases during the course of our study. In total there were 111 episodes of peritonitis in our study which amounts to 0.675 episodes/patient year. S. Vikrant in his study found the incidence of 0.6 episodes/ patient year.<sup>22</sup> Narayan Prasad, Amit Gupta, Archana Sinha, Anurag Singh, Raj Kumar Sharma observed the incidence of 0.68 episodes / patient year in diabetics and 0.50 episodes / patient year in non-diabetic patients.<sup>23</sup> The above mentioned two studies are from India and have almost the same incidence of peritonitis as in our study. Jamal S. Alwakeel, Ahmad H. Mitwalli et al in their study observed the incidence of 0.41 episodes/patient year.<sup>24</sup> Seung Hyeok Han,<sup>1</sup> Sang Choel Lee,<sup>2</sup> Song Vogue Ahn,<sup>3</sup> Jung Eun Lee et al observed incidence of 0.38 episodes / patient year. The higher incidence of peritonitis in patients in India is usually due to less strict hand hygiene technique, performing dialysis in non-hygienic surrounding and the tubing touching the floor. More extensive training and meticulous adherence to hygienic practices is needed to be pursued for all patients to decrease the high incidence of peritonitis in India.

In this study 64% of the patients were alive and continued the CAPD till the conclusion of the study. 25% of the cases had died due to cardiovascular, peritonitis and pneumonia leading to sepsis and cerebrovascular accidents during the course of the study. In 4% of the patients catheter had to be removed and patient shifted to Hemodialysis due to recurrent bacterial peritonitis and fungal colonization of the CAPD catheter. In 6% of the patients renal transplant was done and opted out of the CAPD with the removal of the catheter and in 1% of case CAPD catheter was reinserted after removal, after successfully treating the peritonitis.

Overall the outcome of the study in terms of technique survival is 97% at one year and 94% at two years. This is better the technique survival of 80 and 36% observed by S. vikrant<sup>22</sup> and that of Sanderson MC and Swartzendruber DJ who found survival of 80% and 60%.<sup>25</sup>

Outcome in terms of patient survival showed a 90% patient survival at one year and 78% survival at two years. This outcome of Patient survival in our study is better than other two studies of S. vikrant having patient survival of 80 and 36% at one and two years<sup>22</sup> and Narayan Prasad, Amit Gupta having patient survival of 90% and 72% at one and two years.<sup>23</sup> The reason for better survival of patients in our study may be less number of diabetic patients in our study i.e 27% as compared to 32% and 36% respectively in the above mentioned studies. Relatively cold and less humid climate in our valley may be another factor responsible for less number of infections and subsequent mortality in Kashmir.

In addition better understanding of the dialysis technique and importance of maintaining hygiene by patients, attendants of the patient and the supporting staff is an important contributor of better survival in our patients.

## CONCLUSION

CAPD provides an excellent form of renal replacement therapy despite having a potential for a wide range of complication. With advancement in the technique of CAPD insertion and management of complication there has been significant improvement in the technique and patient survival.

## REFERENCES

1. Syed Munib. Continuous ambulatory peritoneal dialysis. Gomal journal of medical sciences 2006, vol. 4, No. 2.
2. Oxford Text Book of Nephrology. III edition. The patient on dialysis 12.4
3. Ganter G. uber die beseitigung giftiger stoffe aus dem blute durch dialyse. Muench med wochenschr 1923;70:1478-85.
4. Brendan B. McCormic and joanne M. Bargaman. Non infectios complicatios of PD. JASN 2007;18:3023-3025.
5. E.W. Boeschoten: Non infection complications of CAPD. Text book of peritoneal dialysis. IInd edition. P. 395
6. Smith SA, Morgan SH, Eastwood JB. Routine percutaneous insertion of permanent peritoneal dialysis catheters on the nephrology ward. Perit Dial Int 1994;14:284-6.
7. Simkin EP, Wright FK: perforating injuries of the bowel complicating peritoneal catheter insertion. Lancet 1968;1:64-66.
8. Zappacosta AR, Perras ST, Closkey GM. Seldinger technique for Tenckhoff catheter placement. ASAIO Trans 1991;37:13-5.
9. Moreiras Plaza M, Cuina L, Goyanes GR, Sobrado JA, Gonzalez L. Mechanical complications in chronic peritoneal dialysis. Clin Nephrol 1999;52:124-30.
10. Nielsen PK, Hemmingsen C, Friis SU, Ladefoged J, Olgaard K. Comparison of straight and curled Tenckhoff peritoneal dialysis catheters implanted by percutaneous technique: A prospective randomized study. Perit Dial Int 1995;15:18-21.
11. Tzamaloukas AH, Gibel LJ, Eisenberg B, et al. scrotal edema in patients on CAPD: cause differential diagnosis and management: Dial transplant 1992;21:581-590.
12. Chow K.M, Szeto C.C, Lee P.K: Management Option for Hydrothorax Complicating Peritonal Dialysis. Semin Dial 2003; 16: 389-394.
13. Fletcher S, Turney JH, Brownjohn AM. Increased incidence of hydro-thorax complicating peritoneal dialysis in patients with adult polycystic kidney disease. Nephrol Dial Transplant 1994;9:832-833.
14. Spence PA, Mathews RE, Khanna R, et al. Improved results with a paramedian technique for the insertion of peritoneal dialysis catheters. Surg Gynecol Obstet 1985;161:585-587.
15. Afthentopoulos IE, Panduranga Rao S, Mathews R, Oreopoulos DG: Hernia development in CAPD patients

- and the effect of 2.5 l dialysate volume in selected patients: *Clin Nephrol.* 1998;49:251-7.
16. Tse K, Yip P, Lam M, et al. Recurrent Hemoperitonium Complicating Continuous Ambulatory Peritoneal Dialysis. *Perit dial Int.* 2002; 22: 488-491.
  17. Teresa Garcia Falc6n, Ana Rodriguez-Carmona, Miguel perez FontAn et al; Complications of Permanent Catheter Implantation for Peritoneal Dialysis: Incidence and Risk Factors: nephrology unit hospital juan canalejo, A corufia, spain.
  18. Frances DMA, schofeild I et al: Abdominal hernias in patients treated with continuous peritoneal dialysis. *Brit. J surg* 1982;69-409.
  19. Abraham G, Savin E, Ayiomamitis A, et al. Natural history of exit-site infection (ESI) in patients on continuous ambulatory peritoneal dialysis. *Perit Dial Int* 1988; 8:211-6.
  20. Piraino B, Bernardini J, Johnston JR, Sorkin MI. Exit-site location does not influence peritoneal catheter infection rate. *Perit Dial Bull* 1989; 9:127-9.
  21. Oreopoulos DG, Baird-Helfrich G, Khanna R, et al. Peritoneal catheters and exit-site practices: Current recommendations. *Perit Dial Bull* 1987; 7:130-8.
  22. CAPD: A Viable Modality of Renal Replacement Therapy in a Hilly State of India. S. Vikrant. *Indian Journal of Nephrology.* October, 2007;17:165-169.
  23. Narayan Prasad, Amit Gupta, Archana Sinha, Anurag Singh, Raj Kumar Sharma:A comparison of outcome of diabetic and non diabetic CAPD patients: *Peritoneal Dialysis International* 2008;28:468-476.
  24. Alwakeel J.S, Abu-Aisha H, Mitwali A.H, et al. Peritonitis in CAPD at King Khalid University Hospital. *Saudi J Kidney Dis Transplant.* 1998;9:12-7.
  25. Sanderson MC, Swartzendruber DJ et al. *Am j surg* 160:561-5.

**Source of Support:** Nil; **Conflict of Interest:** None

**Submitted:** 08-03-2020; **Accepted:** 26-03-2020; **Published:** 20-04-2020