

Evaluation of efficacy, survival rate and complications of peritoneal catheter placement of patients with end-stage renal disease

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ABSTRACT

Objectives: Peritoneal dialysis (PD) as an equivalent to hemodialysis (HD) is one renal replacement therapy (RRT), which has several advantages compared to hemodialysis. However, most nephrologists are reluctant to apply this method. The purpose of this study is to assess the catheter efficiency, survival rate and complications of PD catheter placement in end-stage renal disease (ESRD) patients.

Methods: From September 2002 to September 2003, 21 patients were operated by PD catheter placement in Imam Hossein Hospital, Tehran, Iran. The kind of catheter and surgical technique were identical in all patients. After surgery, patients were observed for 6 months.

Result: Out of the 21 patients, 13 (61%) were males and 8 (39%) were females. Diabetes and hypertension were the most common cause of nephropathy, mean age was 51.2 years and mean time between operation and from

the beginning of PD was 9 days (range 1-14 days). In 8 (38%) patients, the 2 weeks break-in period was ignored. Complications observed were as follows: peritonitis in 2 (9.5%), leak of dialysate in 2 (9.5%), abdominal wall hernia in 2 (9.5%), catheter malfunction in 2 (9.5%) and abdominal wall hematoma in 2 cases (9.5%). The catheter lasted 6 months in all cases. However, 12 patients who previously received hemodialysis were more satisfied with PD.

Conclusion: From the point of prevalence, our complications were not significantly different from previous studies. The 6-month survival rate and efficiency of catheter was very high. In addition, the rate of satisfaction of patients who received PD was also high. We suggest that more accurate studies on ESRD patients should be carried out to evaluate the use of PD in the primary stage of ESRD instead of HD.

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Chronic renal failure is a pathologic process that most end-stage renal disease (ESRD) patients acquire.^{1,2} To continue life, patients with ESRD depends on alternative methods such as hemodialysis (HD), peritoneal dialysis (PD) and kidney transplantation.¹⁻⁴ Peritoneal dialysis is an appropriate method equivalent to HD, which is has

several advantages such as, lower casts, more simpler procedure, better preservation of residual renal function, lower risk of infection with hepatitis B and C and HIV and better out come after transplantation and preservation of vascular access.^{3-5,7,8} Moreover, PD is a good method for patients who have cardiovascular disease or those

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who do not have a vascular access for hemodialysis.^{3,4,7} With all of these advantages PD is still carried out in few ESRD patients, as most of nephrologists in our country are reluctant to apply this method to their patients due to cultural, educational and economical factors.^{9,10}

In this study, we evaluate the catheter efficiency and survival rate and complications of peritoneal catheter placement in ESRD patients.

Methods. This assessment is a descriptive study carried out in Imam Hossein Hospital, Tehran, Iran on September 2002 to September 2003. During the study period, 23 patients have been operated on peritoneal catheter placement, however, 2 patients died after one week from surgery due to myocardial infarction. Twenty-one catheters were implanted surgically in 21 patients suffering from ESRD. All catheters were swan neck coil PDC with 2 left cuff and implanted with incision under local anesthesia. Intravenous (IV) sedation was administered, if necessary. Prophylaxis regimen was given to all patients: one gram cefazolin IV before surgery and 2 gr cefazolin within the first 24 hours after surgery. After implantation of peritoneal catheter, 50 cc of normal saline with heparin was injected to the peritoneal cavity.

The best time to begin PD is approximately 2 weeks after operation (break-in period), however, due to poor general condition and lack of good vascular access, we were compelled to begin PD in 8 patients earlier. Follow-up was made in all patients after operation until they were discharge from the hospital. Weekly follow-up was then made for one month and then monthly for 6 months in the dialysis center of Imam Hossein Hospital. All of the catheter and surgery related complications and catheter dysfunctions were recorded. All data was analyzed by SPSS version 11. Data analysis on frequency, frequency percentage and indicators like mean, range and SD was carried using EPI.

Results. Among 21 patient 13 (61%) were male and 8 (38%) were female with mean age of 51.2 ± 8.5 years (16-81 years). Causes of renal disease among these patients were: hypertension in 8 (38%), diabetes in 8 (38%), systemic lupus erythematosus in one, nephrotoxin in one, obstruction uropathy in one and unknown cause in the last 2 cases. Eight patients with ESRD had severe heart failure. Twelve patients (57%) had a history of HD as a modality of renal replacement therapy and for 2 cases, kidney transplantation was carried out and was rejected after some time. Mean hospitalization time after surgery was 5 ± 2 days (range 2-14 days). Mean time between operation and beginning of peritoneal dialysis was 9 ± 2.5 days (range 1-14 days). In 8 (38%) patients, the 2

weeks break-in period was ignored due to there bad general physical condition and lack of appropriate vascular access for hemodialysis. After 6 months of follow-up, complications, which have been observed, are as follow: 2 (9.5%) patients had early leak of dialysate, the leakage was pericatheter in one patient and in inguinal site with extension to labia major in the other. In the first patient, PD was delayed for 2 weeks and he was at HD in 2 weeks. The second patient, PD was cut for a few days and then started with intermittent PD. Both patients was cured by conservative therapy. Abdominal wall hematoma was seen immediately after operation in 2 (9.5%) patients. The frequency of peritonitis was 0.01 patient-month. Peritonitis with *Staphylococcus epidermis* was seen in 2 (9.5%) patients, mean time between operation and peritonitis was 3.5 months. (range 1-6 month) and both of the patients was cured with antibiotic therapy. Abdominal wall hernia (umbilical hernia and inguinal hernia) occurred in 2 (9.5%) patients. Mean time between surgery and induce hernia was 4 months, where both of the hernia was repaired by surgery. In 2 (9.5%) patients, early malfunction of catheter was seen, which was through the first month after operation. Catheter malposition, exit-site, tunnel infections and cuff extrusions were not seen in any of the patients. To date, 5 patients expired. Causes of death were myocardial infarction (2 patients), respiratory failure due to SLE (1 patient), septicemia due to infection of cut down site (1 patient). Six months efficacy of catheters was 100%. All 12 patients who received HD before were more satisfied with PD.

Discussion. In our study like other similar studies, diabetes mellitus has become one of the most prevalent causes of renal disease.^{8,16} In this survey, frequency of peritonitis was 0.01 patient months and it does not have any difference with the other studies.^{11,16,17,22,26,27} All of peritonitis in our patients was cured by antibiotic therapy. In Gupta et al¹⁸ study, the mean time was approximately 8 days after peritonitis, 72% of catheters were removed¹⁸ and in other study, 8.6% of catheter were removed as persistent peritonitis.^{12,20,24} In our study, frequency of dialysate leak was 9.5%, which was between the ranges of dialysate leak in the other studies.^{11,13,20,21,23,29} In 8 (38%) patients, we were compelled to start PD before the end of the break-in period, but in these patients we did not have dialysate leak. Other studies, which begins PD in break-in period, dialysate leak increased but our study does not show this, which is significantly different from previous studies.²⁹ Abdominal wall hernia in 2 (9.5%) patients in our study had this rate which is similar to most of the studies.^{13,19} Balaskas et al²⁰ reported 37 (17.8%) hernia in their experience.^{13,14} We have 2 cases (9.5%) with abdominal wall hematoma after operation and was

resolved using conservative methods. Prischl et al³⁰ in their experience reported approximately 46% patients with hematoma, 41% of them need operation to resolve the hematoma. In our study 2 cases (9.5%) of catheter malfunction were seen by laparoscopy as the diagnostic and therapeutic method. The rate of satisfaction of patients in our experience was high.

Survival rate of catheter in our study was similar to other studies.^{11,16,17,19,25,28} Most of our patients were candidate for PD as there last option as they were unsuccessful with the other method like HD or kidney transplantation. Most of them have cardiovascular problem and could not bear general anesthesia and change in blood pressure. It seems that if patients with ESRD becomes a candidate for PD earlier and has better general conditions, we can get better results using PD. We suggest peritoneal catheter replacement immediately for patients with ESRD.

References

- Braunwald E, Fauci A. Harrison's principles of internal medicine. 15th ed. New York: Mc Graw-Hill Inc; 2001.
- Goldman L, Bennett J. Cecil text book of medicine. 21st ed. Philadelphia: WB Saunders Company; 2000.
- Ronco C, Dell'aquila R. Peritoneal dialysis today. Basel (Switzerland): Karager Publisher; 2003.
- Daugirdas J, Blake P. Handbook of dialysis. 3rd ed. Philadelphia: Williams and Wilkins; 2001.
- Van-Biesen W, Vanholder R, Lameire N. The role of peritoneal dialysis as the first - line renal replacement modality. *Perit Dial Int* 2000; 20: 375-383.
- Laupland KB, Church DL, Mucenski M, Sutherland LR, Davies HD. Population-based study of the epidemiology and the risk factors for invasive *Staphylococcus aureus* infections. *J Infect Dis* 2003; 187: 1452-1459.
- Townsendl C, Beauchamp R. Sabiston text book of surgery. 16th ed. Philadelphia: WB Saunders Company; 2001.
- Stojimrovic B, Nestic V. Continuous ambulatory peritoneal dialysis in diabetic patients. *Srp Arch Celok Lek* 1998; 126: 277-282.
- Wang I, Abraham G. Perspective on and obstacles to peritoneal dialysis therapy in Asian countries. *Perit Dial Int* 2002; 22: 243-242.
- Lo WK. What factors contribute to differences in the practice of peritoneal dialysis between Asian countries and the west? *Perit Dial Int* 2002; 22: 249-257.
- Maitra S, Burkart J. Patients on chronic peritoneal dialysis for ten years or more on north America. *Perit Dial Int* 2000; 20 (Suppl 2): S127-S133.
- Douglas W, Wilmore D, Laurence Y, Cheung AH, Harken JW, Holcroft JL, et al. ACS Surgery principle and practice. 1st ed. New York: Webmed Corporation; 2002.
- Delpeso G, Bajo MA. Risk Factors for abdominal wall complications in peritoneal dialysis patients. *Perit Dial Int* 2003; 23: 249-254.
- Dimkovic N, Oreopoulos D. Chronic peritoneal dialysis in the elderly. *Semin Dial* 2002; 15: 94-97.
- Eklund B, Honkanen E. Peritoneal dialysis access: prospective randomized comparison of single-cuff and double-cuff straight tenckhoff catheters. *Nephrol Dial Transplant* 1997; 12: 2664-2666.
- Baek M, Kwon TH. CAPD: an acceptable form of therapy in elderly ESRD patients - a comparative study. *Advanced Peritoneal Dialysis* 1997; 13: 158-161.
- Shyr YM, Su CH, Lui WY. Complication of CAPD: one surgeon's experience with 668 patient - month follow-up. *Advanced Peritoneal Dialysis* 1995; 11: 131-137.
- Gupta B, Bernardini J. Peritonitis associated with exit site and tunnel infections. *Am J Kidney Dis* 1996; 28: 415-419.
- Tokgog B, Dogukan A. Relationship between different body size indicators and hernia development in CAPI patients. *Clin Nephrol* 2003; 60: 183-186.
- Balaskas E, Ikonomo poulos D, Sioulis A, Dombross N, Kassimatis E, Bamichas G, et al. Survival and complications of 225 catheters used in continuous ambulatory peritoneal dialysis: one - center experience in Northern Greece. *Perit Dial Int* 1999; 19 (Suppl 2): 167-171.
- Yata N, Ishikura K, Hataya H. Peritoneal dialysis catheter related complications. *Nippon Jinzo Gakkai Shi* 2003; 45: 378-380.
- Song JH, Kim GA, Lee SW, Kim MJ. Clinical outcomes of immediate full - volume exchange one year after peritoneal catheter implantation for CAPD. *Perit Dial Int* 2000; 20: 194-199.
- Gadallah MF, Torres-Reverac. Relationship between intraperitoneal bleeding, adhesions and peritoneal dialysis catheter failure: a method of prevention. *Advanced Peritoneal Dialysis* 2001; 17: 127-129.
- Copley JB, Lindberg JS, Back SN, Tapia NP. Peritoneoscopic placement of swan neck peritoneal dialysis catheters. *Perit Dial Int* 1996; 16 (Suppl 1): 330-332.
- Lindberg J, Churchill DN, Fishbane S. Research directions: new clinical frontiers. *Am J Kidney Dis* 2000; 36 (Suppl 3): 52-61.
- Oreopoulos D, Tzamaloukas A. Peritoneal dialysis in the next millennium. *Adv Ren Replace Ther* 2000; 7: 338-346.
- Lui SL, Li FK, Lo CY, Lo WK. Simultaneous removal and reinsertion of Tenckhoff catheters for the treatment of refractory exit - site Infection. *Adv Perit Dial* 2000; 16: 195-197.
- Eklund B. Surgical implantation of CAPD catheters: presentation of midline incision - lateral placement method and review of 110 procedures. *Nephrol Dial Transplant* 1995; 10: 386-390.
- Cheng YL, Chau KF, Choiks. Peritoneal catheter - related complications: a comparison between hemodialysis and intermittent peritoneal dialysis in the break-in period. *Advanced Peritoneal Dialysis* 1996; 12: 231-234.
- Prischl F, Wallner M, Kalchmair H. Initial subcutaneous embedding of the peritoneal dialysis catheter - a critical appraisal of this new implantation technique. *Nephrol Dial Transplant* 1997; 12: 1661-1667.